Hybrid Approach In Treating SFA and Popliteal Disease

Venkatesh G. Ramaiah, MD, FACS

Medical Director
Arizona Heart Hospital

Director
Peripheral Vascular & Endovascular Research
Arizona Heart Institute
Definition

hy·brid
[ˈhīˌbrid]
NOUN
biology
the offspring of two plants or animals of different species or varieties, such as a mule (a hybrid of a donkey and a horse):
"a hybrid of wheat and rye" synonyms: cross · cross-breed · mixed breed · half-breed · [more]
half-blood · mixture · blend · amalgamation · combination · composite · compound · fusion
a thing made by combining two different elements; a mixture:
"the final text is a hybrid of the stage play and the film"
HYBRID PROCEDURES
• 70 yr old morbidly obese female had a fem-fem bypass and Bil. Fem pop bypasses done in Vegas for CLI. All were done with Cryopreserved vein

• Now comes with gangrene R Toe with all bypasses occluded
Pre Op Angiogram

Pt. W.
Remote Endarterectomy

Pt. B.
Conclusions:
“When adequate SV is not available, RSFAE with residual SV bypass is a safe and moderately durable procedure that may prove to be a useful adjunct for limb salvage, especially in the presence of foot infection, where an autogenous tissue bypass is preferred”.

Remote Superficial Femoral Artery Endarterectomy and Distal Vein Bypass for Limb Salvage: Initial Experience

David Rosenthal, MD¹; Eric D. Wellons, MD¹; John H. Matsuura, MD¹; Mark Ghegan, MD¹; Frederick W. Shuler, MD¹; and L. Laszlo Pallos, PhD²

¹Department of Vascular Surgery, Atlanta Medical Center, Atlanta, Georgia, USA
²Center for Disease Control, Atlanta, Georgia, USA


D. Rosenthal

Conclusions:
“The primary cumulative patency rate by means of life-table analysis was 61.4% ± 9% (SE), (mean 12.9 months; range, 3-36 months). During follow-up, percutaneous transluminal angioplasty necessary in 14 patients, for a primary-assisted patency rate of 82.6% ± 8%. The locations of restenoses after RSFAE were evenly distributed along the endarterectomy SFAs”.
Hybrid Approach

• Hybrid procedure is suitable for high risk patients
• Improves inflow for above knee bypass. Improves outflow for above knee bypass
• Suitable for limb salvage.
COMBINING THERAPIES

• Angioplasty and surgery, performed in series provides an alternative strategy for revascularization which can:
  – Maximize flow
  – Minimize bypass wound problems
  – Optimize venous conduit usage
  – Ultimately improve outcomes for patients
HYBRID ROOM
Ipsilateral Iliac Stenting and CFA Endarterectomy
CFA Endart/patch with SFA Stenting
Severe Calcific Multilevel Disease
Antegrade AT Puncture

CFA Endart
Hybrid Treatment of SFA and Popliteal

Three Major Categories of Hybrid Procedures:
1) Femoropopliteal Bypass and Distal Endovascular Intervention
2) Endovascular Femoropopliteal Revascularization and Distal bypass
3) Endovascular “Touch Up”
1) Femoro-Popliteal Bypass and Distal Endovascular Intervention
2) SFA Stenting and Distal Bypass
SFA Stenting and Distal Bypass
Distal Targets
3) Endovascular “Touch Up”
Hybrid Procedures for Patients With Critical Limb Ischemia and Severe Common Femoral Artery Atherosclerosis

To evaluate the immediate and midterm results of hybrid (combined open surgical and endovascular) lower extremity revascularization procedures in patients with critical limb ischemia (CLI). Thirty-seven consecutive patients (44 limbs) were treated for CLI using hybrid techniques during a single procedure. The CFA was involved in all limbs and was uniformly treated with endarterectomy and patch angioplasty. Hemodynamically significant atherosclerotic lesions proximal to the CFA were present in 13 limbs, distal to the CFA in 23 limbs, and both above and below the CFA in 8 limbs, and all were treated with endovascular techniques. All patients underwent a detailed clinical assessment and color duplex ultrasonography at 1, 6, and 12 months after the procedure and annually thereafter. The technical success rate was 96.6%, and the limb salvage rate was 95.5%. All patients except three remained free of symptoms without the need for any secondary interventions at the time of the last follow-up. Three patients presented with SFA thrombosis during the first 6 months after the procedure, and two of them had to be amputated. The median follow-up period was 17 months (range: 3-32), and the primary and secondary patency rates at 24 months were 93.2% and 95.5%, respectively. Hybrid lower extremity revascularization procedures can be used to treat CLI with low perioperative morbidity and mortality and good immediate and midterm patency and limb salvage, thus providing an attractive alternative to larger open surgical interventions.
Simultaneous hybrid revascularization for symptomatic lower extremity arterial occlusive disease JIN HYUN JOH, SUN-HYUNG JOO and HO-CHUL PARK Department of Surgery, Kyung Hee University Hospital at Gangdong, Kyung Hee University School of Medicine, Seoul 134-727, Republic of Korea
Abstract. Multilevel revascularization, using a combination of endovascular and open (hybrid) surgery, is increasingly being used. Hybrid surgery allows complex anatomy to be treated by minimally invasive procedures in medically high risk patients. The aim of the present study was to report a novel hybrid surgery for lesions in the multilevel lower extremity arteries and to evaluate the clinical outcomes. Consecutive patients who presented at a single institution between March 2009 and February 2012 were selected for inclusion in the study. The patients had disabling claudication or critical limb ischemia and underwent treatment for revascularization by open surgery or by a combination of open surgery and endovascular procedure. Retrospective analysis was conducted from a prospectively collected database. All procedures were performed by a vascular surgeon in an operating room. Postoperative surveillance in outpatient clinics was conducted at 3 and 6 months and every 6 months thereafter. A total of 76 patients were included in the study with a mean age of 67.1±11.3 years (range, 42-94 years) and the male to female ratio was 67:9. The most common indication for revascularization was Rutherford category IV (resting pain). The immediate technical success rate of hybrid surgery was 90.5%, with an overall limb salvage rate of 97.4%. The primary patency rates of the hybrid and open groups were 100 and 90.9%, respectively (P=0.441). Therefore, the results of the present study indicate that hybrid surgery is a feasible option for the treatment of multilevel peripheral arterial occlusive disease, showing favorable patency and limb salvage rates. These observations indicate that femoral endarterectomy plays a vital role in hybrid surgery.
Combined intraoperative iliac artery stents and femoro-popliteal bypass for multilevel atherosclerotic occlusive disease.
Liu C¹, Guan H, Li Y, Zheng Y, Liu W.

¹Department of Surgery, Peking Union Medical College Hospital, CAMS & PUMC, Beijing 100730.

OBJECTIVE: To review our preliminary experience and evaluate our early results of a combined intraoperative iliac angioplasty and stenting with infrainguinal revascularization in multilevel atherosclerotic occlusive disease.

METHODS: From July 1999 to April 2000, intraoperative iliac angioplasty and stenting combined with simultaneous femoro-popliteal bypass were performed on 12 lower extremities of 10 patients suffering from multilevel atherosclerotic occlusive disease. There were 8 men and 2 women, average 72 years. The indications for procedures included disabling claudication in 3 and rest pain in 7 patients.

RESULTS: Eleven iliac angioplasty and stent procedures combined with simultaneous 9 femoro-popliteal by-pass and 3 femoro-femoral-popliteal bypass were performed in 12 limbs of 10 patients. Angioplasty and stent placement was technically successful in all patients. One contralateral femoral-popliteal bypass was failure after femoro-femoral-popliteal bypass. There were no additional instances of procedural or postoperative morbidity or mortality. Mean follow-up was 5 months (range 1 approximately 10 months). During the follow-up period, one femoro-infrapopliteal graft became occluded after 7 months and above-knee amputation was required. The cumulative primary patency rate of stented iliac arteries, femoro-femoral bypass grafts and femoro-popliteal bypass grafts were 100% (11/11), 100% (3/3) and 90.9% (10/11) in the follow-up period, respectively. The amputation rate was 8.3% (1/12).

CONCLUSIONS: Intraoperative iliac artery PTA and stent placement can be safely and effectively performed simultaneously with infrainguinal revascularization for multilevel atherosclerotic occlusive disease by skilled vascular surgeon, using a portable C arm fluoroscopy in the operating room. Furthermore, iliac artery PTA and stenting was valuable adjunct to distal bypass either to improve inflow and outflow, or to reduce the extent of traditional surgical intervention, and also, any angioplasty and stenting-related complications can be immediately corrected as well.
Dosluoglu et al. reported their retrospective series comparing results for hybrid interventions, open surgical reconstruction, and endovascular procedures in 654 patients. The postintervention cardiac morbidity and mortality rates for the hybrid group (5.6% and 6.4%, respectively) were comparable to the open group (3.5% and 3.1%) but significantly higher than the endovascular group (1.1% and 1.1%), presumably because patients in the hybrid group had higher risk factors. The 12- and 36-month limb salvage rates were excellent and comparable in all three groups (ranging from 80% to 100%). Three-year primary and secondary patency rates and long-term survival were similar in all three groups.
Lantis et al. reported 95% patency and limb salvage rates in 22 diabetic patients with critical leg ischemia after endovascular intervention on the SFA and popliteal-based distal bypass.

St. Lukes NY, Annals of surgery, 2010
Intraoperative superficial femoral artery balloon angioplasty and popliteal to distal bypass graft: an option for combined open and endovascular treatment of diabetic gangrene.

Schneider PA¹, Caps MT, Ogawa DY, Hayman ES.

¹Division of Vascular Therapy, Hawaii Permanente Medical Group, Honolulu, USA.

PURPOSE:
The purpose of this study was to evaluate the results of combining intraoperative balloon angioplasty (IBA) of the superficial femoral artery (SFA) with distal bypass graft originating from the popliteal artery as a method of lower extremity revascularization in diabetic patients with gangrene.

METHODS:
Among 380 infrainguinal bypass grafts performed over a 6-year period, there were 110 reversed saphenous vein bypass grafts to the tibial or pedal arteries to treat diabetic patients with gangrene. Diffuse infrainguinal disease was treated with femoral-distal bypass graft (long; n = 46). Popliteal-distal bypass graft was performed when the inflow femoral artery was not significantly diseased (short; n = 52). Focal SFA stenosis and severe infrageniculate disease were treated with combined IBA of the SFA and distal bypass graft originating from the popliteal artery (combined; n = 12). Follow-up was performed with duplex scan surveillance of both the bypass graft and IBA sites. Treatment groups were compared with life-table analysis.

RESULTS:
There were no perioperative graft failures or amputations. The perioperative mortality rate was 1% (1 of 110). The 2-year primary patency rates were similar in the three groups: 72% in the long bypass graft group, 82% in the short bypass graft group, and 76% in the combined group (P = .8, log-rank test). SFA IBA sites developed recurrent stenosis in two patients, at 7 and 48 months; both were detected with surveillance and treated with percutaneous transluminal balloon angioplasty. The overall 5-year rate of primary patency was 63%, secondary patency was 78%, limb salvage was 81%, and survival was 35%. There were no significant differences among the three treatment groups with respect to these outcomes.

CONCLUSION:
Results with the combined procedure were similar to those achieved with either femoral-distal bypass graft or popliteal-distal bypass graft without SFA IBA. These data suggest that IBA of the inflow SFA may be combined with popliteal to distal bypass graft and that this technique is a reasonable alternative to longer, femoral-origin bypass graft in selected diabetic patients with gangrene.
Hybrid vascular surgical techniques open up a world of opportunity for the vascular specialist. Rather than considering a patient in terms of suitability for open surgery or endovascular intervention, multilevel disease can be appraised on its merits, and each region can be treated with an approach that will best optimize outcomes and ensure safety for the patient as a whole. It is now commonplace in most advanced critical limb ischemia centers for multidisciplinary teams or vascular specialists trained in both open surgery and interventional techniques to utilize an individualized, hybrid revascularization strategy for patients with limb-threatening ischemia resulting from multilevel peripheral artery disease.
Grateful Patient

*All patients may not expect this level of success
Hybrid Approach In Treating SFA and Popliteal Disease

Venkatesh G. Ramaiah, MD, FACS

Medical Director
Arizona Heart Hospital

Director
Peripheral Vascular & Endovascular Research
Arizona Heart Institute